5-25-93

MRID No. 425073-02

DATA EVALUATION RECORD

1. **CHEMICAL:** Endothall Technical.
Shaughnessey No. 038901.

2. **TEST MATERIAL:** Endothall Technical; 7-oxabicyclo[2.2.1] heptane-2,3-dicarboxylic acid; CAS No. 145-73-3; Lot No. G 05A; Batch No. 259; 83.02% active ingredient; an off-white, crystalline solid with a distinctive odor.

3. **STUDY TYPE:** 71-4. Avian Reproduction Study.
Species Tested: Bobwhite quail (*Colinus virginianus*).

4. **CITATION:** Pedersen, C.A., D.W. Fletcher, and C.L. Lesar. 1992. Endothall Technical: Toxicity and Reproduction Study in Bobwhite Quail. Conducted by Bio-Life Associates, Ltd., Neillsville, WI. Laboratory Project ID No. BLAL No. 89 QR 41. Submitted by Elf Atochem North America, Philadelphia, PA. EPA MRID No. 425073-02.

5. **REVIEWED BY:**

Dennis J. McLane, Wildlife Biologist **Signature:** Dennis McLane
Section 1, Ecological Effect Branch
Environmental Fate and Effects Division **Date:** 5-28-93

6. **APPROVED BY:**

Les Touart, Section Chief **Signature:**
Section 1, Ecological Effect Branch
Environmental Fate and Effects Division **Date:**

7. **CONCLUSIONS:** This study is scientifically sound but does not fulfill the guideline requirements for an avian reproduction study. The control and lowest dose mortality were very high 22%. Based on this, it is likely that the tested populations were not randomly selected. The no-observed-effect concentration (NOEC) was 250 ppm a.i., the highest concentration tested. The most important item to come from this report is that the higher the dose of endothall the lower the mortality. Therefore, the endothall may be affecting the behavior of the birds. Less excitable birds in the wild may not be able compete or avoid predators as well as normal birds.

8. **RECOMMENDATIONS:** Provide a study which addressses the items in 14C because control population used in this study may have obscured effects.

9. **BACKGROUND:** As per the List B - Phase IV, Dicarboxylic Endothall (038905) (March 14, 1991), §71-4(a) avian reproduction/quail study is,..." Required for products registered for multiple treatments per season. May also required depending on environmental fate information".The List B indicates that the N with the above quotation as a footnote.

The List B - Phase IV, Dipotassium Endothall (038904) indicates Reserved with this footnote, "Reserved pending additional use and environmental fate information. Required for products registered for multiple treatments per season."

The List B - Phase IV, Disodium Endothall (038903) indicates "Reserved" with this footnote, "Reserved pending additional use information Required for products registered for multiple treatments per season."

The List B - Phase IV, Endothall Acid (038901) indicates NA.

10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.

11. **MATERIALS AND METHODS:**

A. **Test Animals:** The birds used in this study were bobwhite quail (*Colinus virginianus*) purchased from Oak Ridge Game Farm, Gravette, AR. The birds were 25 weeks of age at study initiation and were acclimated to the laboratory environment for 29 days. All birds were phenotypically indistinguishable from wild birds. At test initiation, all birds were examined for physical injuries and general health.

B. **Dose/Diet Preparation/Food Consumption:** Diets were prepared by dissolving appropriate amounts of the test substance in tap water. This mixture was then dispensed into the basal feed and mixed for 10-15 minutes. Diets were prepared fresh weekly, approximately 24 hours prior to administration. The control diet consisted of tap water and basal feed. Each of the three treatment groups and the control group were fed the appropriate diet for 20 weeks.

Basal diet for adult birds during the first 8 weeks of the study was Purina® Duck Grower W/O. The birds received Purina® Game Bird Breeder Layena from week 9 until study termination. The composition of these diets were presented in the report. The test substance was not mixed into the diet of the offspring. Food and

water were supplied *ad libitum* during acclimation and during the test.

Samples of control and treated diets were collected and frozen during test weeks 1, 6, 12, 15, 16, 17, 18, 19, and 20. Samples were shipped under dry ice to Columbia Laboratories, Inc. for concentration verification. Beginning during test week 17, duplicate samples were collected and frozen. The duplicate set of samples from test week 18 were shipped under dry ice to Hazleton Washington, Inc. for analyses.

C. **Design:** The birds were randomly distributed into four groups as follows:

Endothall Technical Nominal Concentration	Number of Pens	Birds Per Pen	
		Males	Females
Control (0 ppm a.i.)	12	1	2
10 ppm a.i.	12	1	2
50 ppm a.i.	12	1	2
250 ppm a.i.	12	1	2

Treatment levels were based upon the results of a 28-day dietary pilot study. The diets were adjusted for percent purity and are reported as parts per million (ppm) of active ingredient (a.i.). Adult birds were identified by individual wing tags. Study phases and their approximate durations were as follows:

1. Quarantine Period - 29 days
2. F_0 Generation Test Period - 20 weeks
3. F_1 Generation Growth Period - 13 weeks.

D. **Pen Facilities:** Adult birds were housed in pens constructed of wire mesh. Each pen measured 53.3 x 61.0 x 38.1 cm and was equipped with a feeder and one-quart water jug. The pens were placed over galvanized dropping pans in an indoor environment, maintained at an average temperature of 68°F (20°C) and an average relative humidity of 64%.

The photoperiod during the first 8 weeks of the study was 7 hours of light per day. The photoperiod was increased to 17 hours of light per day for the duration of the study. Throughout the study, the birds received a minimum of 6 footcandles of illumination.

E. **Adult Observations/Gross Pathology:** Adult birds were observed daily throughout the study for signs of toxicity, injuries, or illness. Mortalities occurring prior to terminal adult sacrifice were recorded and necropsied. Necropsies were also conducted on half of all surviving adult birds from each group at termination of the study. Adult body weights were measured at study initiation, biweekly through week 6, and at study termination (week 20). Feed consumption was measured by cage weekly throughout the adult phase of the study, but was calculated on a biweekly basis.

F. **Eggs/Eggshell Thickness:** Eggs were collected daily during the production period and were labeled according to pen of origin. Normal eggs were stored at 56-62°F (13-17°C) with a relative humidity of 75%. The eggs were turned once daily. Eggs were removed from the egg cooler weekly and eggs not cracked or used for eggshell thickness measurements were placed in an incubator maintained at 99.7°F (37.6°C) with a relative humidity of approximately 57%. All eggs were turned automatically every four hours while in the incubator. Eggs were candled on day 11 of incubation to determine fertility and embryo viability and again on day 18 to determine embryo survival. On incubation day 21, the eggs were placed in hatching trays. On day 24, all hatchlings, unhatched eggs (embryos not showing life at day 18) and full term eggs (embryos that did not liberate from the shell) were removed from the incubator.

Eggs were collected from all pens on the first day of alternate weeks during the test period for eggshell thickness measurements. Eggs used for eggshell thickness were opened and the contents removed. The shell was washed and allowed to air dry for a minimum of 48 hours at room temperature. The average thickness of the dried shell was determined by measuring (to the nearest 0.01 mm) three points around the equator of the egg.

G. **Hatchlings:** Hatchlings were removed from the hatcher and housed according to week of hatch and parental treatment group. All chicks were observed daily and received untreated diet during the 14-day observation period. The temperature that the chicks were maintained at ranged from 88-116°F (31-47°C) and the relative humidity from 24-70%. Hatchling body weights were measured and recorded at hatch and on day 14. Feed consumption was not monitored.

Hatchlings were observed daily throughout the 14-day period for signs of toxicity, injuries, or illness. Gross pathological examinations were conducted on birds found dead during the 14-day observation period and on selected survivors from each group and hatch.

H. **Statistics:** Analysis of variance (ANOVA) was used to statistically analyze the following parameters:

Adult Body Weight	Hatchling Body Weight
Adult Feed Consumption	Eggshell Thickness

Contingency Table Analysis was used to statistically analyze the following parameters:

Eggs Set of Net Eggs Laid	Eggs Laid Per Hen
One Week Eggs of Viable Embryos	Midterm Eggs of Viable Embryos
Full-Term Eggs of Viable Embryos	Viable Embryos of Eggs Set
Infertile Eggs of Eggs Set	Live 3-Week Embryos of Viable Embryos
Hatchlings of Viable Embryos	Defective Eggs of Eggs Laid
Cracked Eggs of Eggs Laid	14-Day Old Survivors of Hatchlings
Normal Eggs of Eggs Laid	

12. **REPORTED RESULTS:**

A. **Diet Analysis:** The results of the diet analysis were not presented in the report.

B. **Mortality and Behavioral Reactions:** The percent mortality in the control, 10, 50, and 250 ppm a.i. groups were 22, 22, 11, and 5%, respectively. During the study, a total of 41 birds developed regions of excoriation which were attributed to increased activity and additional stress due to increased day-length during the egg production period. The affected birds did not exhibit any abnormal behavior other than slightly restricted mobility of the affected region, lethargy, and weight loss. *Post mortem* examinations of the birds that died and of half of the survivors showed abnormal findings. However, these findings were not considered to be treatment-related because of the inconsistency and lack of dose responses.

C. **Adult Body Weight and Food Consumption:** There were no significant differences in adult body weight or food

consumption between the control and treatment groups during the study (Tables 1A and 1B, attached).

D. **Reproduction:** Egg production started during week 8 and egg infertility values were adjusted in pens which males died. A significantly lower number of infertile eggs were observed at 50 ppm a.i. and a significantly higher number of full term eggs were observed at 10 and 50 ppm a.i. (Table 3B, attached). These findings were not considered to be treatment-related because the 250 ppm a.i. group was not affected. No significant differences between the control and treatment groups were noted in any other reproductive parameters (Table 4, attached).

E. **Egg Shell Thickness:** There were no significant differences in the overall mean eggshell thickness when compared to control eggs (Tables 6B, attached).

F. **Offspring:** Significantly lower mean body weights for certain hatches (when compared to controls) were reported at 50 and 250 ppm a.i. on day 1 and at 250 ppm a.i. on day 14. Significantly higher mean body weights for certain hatches (when compared to controls) were reported at 10, 50, and 250 ppm a.i. on day 1 and at 10 and 250 ppm a.i. on day 14 (Tables 8 and 9, attached). When all hatches were combined, a significantly higher difference was observed at 250 ppm a.i. on day 1 and at 10 ppm a.i. on day 14. These findings were not considered to be toxicologically significant.

There were no treatment-related clinical signs observed during the 14-day period. Gross pathological examinations of chicks that died and of selected chicks on day 14 revealed no treatment-related findings.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:** "The ingestion of Endothall Technical by the parental generation did not adversely affect the reproductive success of the F_0 generation or the viability of the offspring in the F_1 generation. The no-observed-effect level was determined to be 250 ppm a.i."

The report stated that the study was conducted in conformance with Good Laboratory Practice regulations (40 CFR Part 160). Quality assurance audits were conducted during the study and the final report was signed by a Quality Assurance Officer for Bio-Life Associates, Ltd.

14. **REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:**

A. **Test Procedure:** The test procedures were in accordance with Subdivision E - Hazard Evaluation: Wildlife and Aquatic Organisms, ASTM, and SEP guidelines except for the following deviations:

The test material should be administered for 10 weeks before egg collection; eggs were collected as early as week 8.

The eggs were incubated at 37.6°C and 57% relative humidity; 39°C and 70% are recommended.

Observations on food palatability were not reported.

B. **Statistical Analysis:** Statistical analyses of reproductive parameters were performed by the KBN reviewer using analysis of variance (ANOVA) following square-root transformation of the count data and arcsine square-root transformation of the ratio data. The comparison between control data and data from each treatment level was made using multiple comparison tests. The computer program used is based on the EEB Birdall program, with an exception that the count data were square-root transformed before the ANOVA. The significance level was $p \leq 0.05$.

The statistical results were similar to those reported by the authors, except that the significant results reported by the authors were not significant in the reviewer's analysis.

C. **Discussion/Results:** Diet samples had been collected at intervals during the study but the analytical results were not included in the report.

Control mortality in this test is rather high (i.e., 22%). The test population was not randomly selected, mortality was also high in the lowest dose and the middle dose with 22% and 11% mortality, respectively. Although there was a lack of dose responses among treatment groups, the high mortalities could have confounded the effects of the test material. Most birds appeared to die from excoriation which was probably due to the crowded environment (three birds per cage). In future tests, the laboratory should place only one male and one female in each cage to reduce the incidence. The most important item to come from this report is that the higher the dose of endothall the lower the mortality. Therefore, the

endothall may be affecting the behavior of the birds. Less excitable birds in the wild may not be able compete or avoid predators as well as normal birds.

Also, the test material should be administered for 10 weeks before egg collection; eggs were collected as early as week 8.

This study is scientifically sound but does not fulfill the guideline requirements for an avian reproduction study. The NOEC was 250 ppm a.i., the highest concentration tested. The dosage levels selected do not address the potential contamination. The Herbicide 273 label indicates that it contains 3 lbs endothall per gallon. The broadcast rate for sugar beets is 2.2 gal/A. This equates to 6.6 lbs/A or residues, therefore, residues as high as (240 * 6.6 = 1584) 1584 ppm. Based on this the test dosage levels should be 316.8 ppm, 1584 ppm, and 7920 ppm unless the pretest feeding (mallard fed 5000 ppm for 114 days had less than 10% mortality) or LC_{50} studies (LC_{50} >10000 for bobwhite quail and mallards) show a mortality due to the test material can be expected. If these studies indicate that the birds can not survive for the duration of the study then lower study rates are acceptable.

D. **Adequacy of the Study:**

(1) **Classification:** Supplemental.

(2) **Rationale:** Control mortality was excessive and may have inadvertently selected a population which was not typical of the wild species. Also the test levels would not support such as the broadcast rate for the use on sugar beets.

(3) **Repairability:** No

15. **COMPLETION OF ONE-LINER:** Yes; 01/25/93.

landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

SUPPLEMENTAL LABELING

For Use In Hops Sucker Suppression
Not For Use In California

Use	Rate/Acre	Remarks
To suppress hops sucker growth	0.5 - 1.0 lb. ai	Apply once or twice per season. Make first application when main bines are 2 - 3 feet tall. Subsequent application may be made 7 - 14 days later when hops suckers are 1 - 2 feet long. Spray only basal portion of plant. Avoid spraying main bine within 1 - 2 feet of growing point. Apply in sufficient water for adequate coverage (15 - 40 gpa). Do not apply within 85 days of harvest. Apply with ground equipment only.

Observe all applicable precautions and limitations on the EPA-registered label for this product.

WARRANTY AND DISCLAIMER

Elf Atochem North America warrants that this material conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the Directions for Use, subject to the risks referred to therein. ELF ATOCHEM MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS OR MERCHANTABILITY OR ANY OTHER EXPRESS OR IMPLIED WARRANTY. IN NO CASE SHALL ELF ATOCHEM OR SELLER BE LIABLE FOR CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, BUSINESS REPUTATION, OR CUSTOMERS; LABOR COST; OR OTHER EXPENSES INCURRED IN PLANTING OR HARVESTING.

Elf Atochem and seller offer this product and the buyer and user accept it subject to the foregoing conditions of sale and warranty which may be varied only by agreement in writing signed by a duly authorized representative of Elf Atochem.

5-C204S-01 D8 (1/91)

HERBICIDE 273

SUGAR BEET HERBICIDE

ACTIVE INGREDIENT:
Dipotassium salt of endothall* 40.3%
INERT INGREDIENTS: 59.7%
TOTAL. 100.0%

*7-oxabicyclo[2.2.1]heptane-2, 3-dicarboxylic acid equivalent 28.6%
This product contains 4.23 lbs. dipotassium endothall per gallon (equivalent to 3 lbs. endothall)

EPA Registration No. 4581-223 EPA Establishment No. 228-IL-1

KEEP OUT OF REACH OF CHILDREN

DANGER–POISON

PRECAUCION AL USUARIO: Si usted no lee ingles, no use este producto hasta que la etiqueta haya sido explicado ampliamente.

STATEMENT OF PRACTICAL TREATMENT

If swallowed, drink promptly a large quantity of milk, egg whites, gelatin solution or, if these are not available, drink large quantities of water. Avoid alcohol. Call a physician immediately.

If on skin, immediately flush with plenty of water for at least 15 minutes after removing contaminated clothing and shoes.

If in eyes, immediately flush with plenty of water for at least 15 minutes. Call a physician.

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock, respiratory depression, and convulsion may be needed.

GENERAL INFORMATION

HERBICIDE 273 is a liquid formulation which mixes readily with water for use in the control of cheetgrass, redroot or pigweed, Kochia, foxtails, burclover, blueweed (henbit), Texas blueweed, volunteer barley, wild buckwheat, barnyardgrass, bullgrass, annual bluegrass, ragweed, purslane, smartweed, wild carrot, volunteer sunflowers, and shepherdspurse in sugar beets.

Mix the recommended amounts of HERBICIDE 273 listed in the table below in 2 to 15 gallons of water per acre for aerial application and in 15 to 40 gallons of water per acre for ground equipment.

This material is known to be phytotoxic to a wide variety of plants, especially strawberries. For aerial application a 50-foot buffer zone downwind from the wing edge is recommended to avoid injury to desirable plants. Apply when there is a positive wind of less than 10 mph. A height of 6 to 10 feet over the crop is recommended. Keep nozzle pressure below 40 psi.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Do not apply this product through any type of irrigation system.

RE-ENTRY STATEMENT

Do not apply this product in such a manner as to directly or through drift expose workers or other persons. The area being treated must be vacated by unprotected persons.

Do not enter treated areas without protective clothing until sprays have dried.

Because certain states may require more restrictive reentry intervals for various crops treated with this product, consult your State Department of Agriculture for further information.

Written or oral warnings must be given to workers who are expected to be in an area about to be treated with this product. In case of accidental exposure, workers should wash thoroughly with soap and water and contaminated clothing should be removed and washed before reuse. If symptoms of skin or eye irritation occur call a physician. When oral warnings are given, warnings shall be given in a language customarily understood by workers. Oral warnings shall be given if there is reason to believe that written warnings cannot be understood by workers. Written warnings must include the following information: "DANGER. Area treated with HERBICIDE 273 Sugar Beet Herbicide on (date of application). Do not enter without protective clothing until spray has dried. In case of accidental exposure, workers should wash thoroughly with soap and water and contaminated clothing should be removed and washed before reuse. If symptoms of skin or eye irritation occur call a physician."

PRE-EMERGENCE APPLICATIONS

Field tests have shown that best pre-emergence results are obtained when HERBICIDE 273 is sprayed onto the seed bed during planting in a manner that spray would be incorporated into the soil not exceeding 1½ inches deep. High moisture content of soil is essential for best weed control. Apply before sugar beets emerge from the soil.

HERBICIDE 273 Per Acre*

Broadcast Rates	Band Width	Band Rates—Pints, Row Spacing 22"	28"	32"
1.0-2.2 Gallons/Acre	5"	2.0-4.0	1.5-3.0	1.25-3.0
	7"	2.5-5.5	2.0-4.5	1.75-4.0
	10"	3.5-8.0	3.0-6.5	2.5 -5.5

*NOTE: For fine soils, use the lower rate. For use on the soils of Eastern Colorado and Western Nebraska, apply 1.5 to 3 pints HERBICIDE 273 for 7 inch band application on rows 22 inches wide. Adjust rate proportionately for other band widths and row spacings.

POST-EMERGENCE APPLICATIONS

Make application when the sugar beets have 2 to 4 true leaves (do not count the cotyledonary leaves, which are the first 2 leaves to appear). Under certain weather conditions, some temporary marginal leaf burn may occur to the sugar beets, especially at the higher rates, but recovery is normally rapid. For best results, apply when the temperature is between 60°F and 80°F. Do not apply later than 60 days after sugar beet emergence.

HERBICIDE 273 Per Acre*

Broadcast Rates	Band Width	Band Rates—Fluid Ounces, Row Spacing 22"	28"	32"
1-2 Quarts/Acre	5"	7-15	6-11	5-10
	7"	10-20	8-16	7-14
	10"	15-29	11-23	10-20

*NOTE: Use the lower rates of HERBICIDE 273 when the sugar beets have only 2 true leaves, or when spraying very susceptible weeds such as smartweed or wild buckwheat at early growth stage (2 to 4 true leaves).

TANK MIXES OF HERBICIDE 273 AND SELECTED HERBICIDES

FOR POST-EMERGENCE USE ON SUGAR BEETS ONLY

Follow all directions and precautions that appear on both product labels. In addition to the weeds previously mentioned, tank mix combinations of HERBICIDE 273 plus one of the herbicides listed below will control a broader spectrum of annual broadleaf weeds and seedling grasses than either herbicide used alone. For best results, apply when sugar beets are at the 4 to 6 true leaf stage, and when the weeds are actively growing and are

DES-I-CATE®

POTATO VINE KILLER AND A HARVEST AID FOR ALFALFA AND CLOVER

0.52 lbs. endothall* per gallon

ACTIVE INGREDIENT:	
(N,N-dimethylalkylamine)** salt of endothall*	15.9%
INERT INGREDIENTS:	84.1%
TOTAL	100.0%

*7-oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid equivalent 5.5%
**Alkyl groups as in fatty acids of coconut oil

Registration No. 4581-206 EPA Establishment No. 4581-TX-1

KEEP OUT OF REACH OF CHILDREN

PELIGRO DANGER

PRECAUCION AL USUARIO: Si usted no lee ingles, no use este producto hasta que la etiqueta haya sido explicado ampliamente.

STATEMENT OF PRACTICAL TREATMENT

IN EYES, immediately flush with plenty of water for at least 15 minutes. Call a physician.

ON SKIN, immediately flush with plenty of water for at least 15 minutes. Remove and wash contaminated clothing before reuse.

IF SWALLOWED, drink promptly a large quantity of milk, egg whites, gelatin solution or if these are not available, drink large quantities of water. Avoid alcohol. Call a physician immediately.

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock, respiratory depression, and convulsion may be needed.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS (AND DOMESTIC ANIMALS)

DANGER

CORROSIVE. CAUSES IRREVERSIBLE EYE DAMAGE. CAUSES SKIN IRRITATION. MAY BE FATAL IF ABSORBED THROUGH SKIN. HARMFUL IF SWALLOWED OR INHALED. DO NOT GET ON EYES, ON SKIN OR ON CLOTHING. WEAR PROTECTIVE CLOTHING, RUBBER GLOVES AND GOGGLES OR FACE SHIELD WHEN HANDLING. Wash thoroughly with soap and water after handling and before eating or smoking. Avoid breathing spray mist. Remove contaminated clothing and wash before reuse.

ENVIRONMENTAL HAZARDS

Avoid contact with or drift to other crops, trees, or plants as injury may occur. To avoid drift use coarse sprays and do not apply in windy weather.

This product is toxic to fish and wildlife. Keep out of lakes, streams or ponds. Do not contaminate water when disposing of equipment washwaters.

Do not feed treated forage to dairy animals being finished for slaughter.

Do not use on forage to be sold commercially or to be shipped interstate.

Do not graze treated areas.

GENERAL INFORMATION

DES-I-CATE is a water soluble formulation of endothall containing a specific inorganic salt and an amine for use as a defoliant or desiccant for drying, hardening, and removing green plant growth from certain seed crops prior to harvesting to permit direct combining, such as alfalfa and clover.

It is also a contact-type herbicide for killing potato vines. In addition to facilitating harvesting, DES-I-CATE assists in setting potato skins.

Use recommended rate of DES-I-CATE with water as a carrier. DES-I-CATE disperses readily in water and remains uniformly in solution. It is suggested to fill the tank with water first and then add DES-I-CATE since there is a possibility of foaming. In case of excessive foaming add small amount of antifoam to spray tank.

For aerial as well as ground applications, complete coverage of plants with DES-I-CATE in the liquid state is essential for best results. Therefore, a spray droplet size should be used and application should be made preferably during periods of highest relative humidity (early morning or late) if daytime temperatures are expected to reach 80° or higher. Wash sprayer immediately after use.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Do not apply this product through any type of irrigation system.

ENTRY STATEMENT

Do not apply this product in such a manner as to directly or through drift expose workers or other persons. The area being treated must be vacated by unprotected persons.

Do not enter treated areas without protective clothing until sprays have dried.

Because certain states may require more restrictive reentry intervals for various crops treated with this product, consult your State Department of Agriculture for further information.

Written or oral warnings must be given to workers who are expected to be in an area about to be treated with this product. In case of accidental exposure, workers should wash thoroughly with soap and water and contaminated clothing should be removed and washed before reuse. If symptoms of skin or eye irritation occur call a physician. When oral warnings are given, warnings shall be given in a language customarily understood by workers. Oral warnings shall be given if there is reason to believe that written warnings cannot be understood by workers. Written warnings must include the following information: "DANGER. Area treated with DES-I-CATE Harvest Aid on (date of application). Do not enter without protective clothing until spray has dried. In case of accidental exposure, workers should wash thoroughly with soap and water and contaminated clothing should be removed and washed before reuse. If symptoms of skin or eye irritation occur call a physician."

POTATOES

Apply to potato vines 10 to 14 days prior to harvest, using the recommended rate of DES-I-CATE thoroughly mixed with water as follows:

For Aerial Applications: Light to medium vine growth—Apply 1½ to 2 gallons of DES-I-CATE in 5 to 10 gallons of total spray per acre.

Heavy vine growth—Apply 2 gallons of DES-I-CATE in 5 to 10 gallons total spray per acre. Use of 10 gallons total spray will improve coverage on heavy vine growth. For exceptionally heavy vines it is sometimes advisable to apply one gallon of DES-I-CATE in 5 gallons of spray in one direction followed immediately by a similar amount applied at right angles to the first set of swaths.

For Ground Applications: Light to medium vine growth—Apply 1½ to 2 gallons of DES-I-CATE per acre in 20 to 100 gallons of total spray. Use higher rate during cool, cloudy weather.

Heavy vine growth—Apply 2 gallons of DES-I-CATE per acre in 20 to 100 gallons of total spray. For Northwest conditions, it is suggested that total spray in ground equipment not exceed 40 gallons per acre.

NOTE: The addition of 3 to 5 gallons per acre of diesel fuel or 1 pint of paraffin base herbicidal oil for each 20 gallons of total spray may increase speed and overall vine kill. No wetting agent or emulsifier is required since DES-I-CATE will normally emulsify diesel fuel or other herbicidal oil. Do not use high rate, diesel fuel or other oils under conditions favorable for rapid vine kill such as low soil moisture or high temperatures since stem-end discolorations may occur. When using diesel fuel, always add the oil last to the DES-I-CATE and water to avoid the possibility of forming an invert emulsion.

ALFALFA AND CLOVER

(Seed Crops Only—Seed from treated fields should be used for planting purposes only. Do not use seed for food, feed, or oil purposes.)

Alfalfa and Clovers (Crimson C., Alsike C., Ladino C., Red C., Sweet C. and White C.).

For Aerial Applications: The following rates are recommended:

Medium stands: Use 1¼ gallons of DES-I-CATE in 8½ gallons of water per acre in one application.

Heavy stands: Use ¾ to 1¼ gallons of DES-I-CATE in 8½ to 9 gallons of water per acre and repeat application in 3 to 5 days; or use 1½ gallons of DES-I-CATE in 8 gallons of water per acre in one application.

For Ground Application: Use the same rates of DES-I-CATE per acre, but increase the water to make a total spray of 15 to 20 gallons per acre.

When to combine is dependent on the weather but usually the desiccated alfalfa or clover is ready to combine 5 to 10 days after treatment.

NOTE: Seed crops should not be sprayed until the seed is mature and the plants have lost moisture normally following the end of the irrigation season. Spraying before the seed has reached maximum dry weight may result in yield reduction. Seed crops are normally ready for combining 5 to 10 days after treatment. For best results combine the seed crop as soon as it is ready for harvest.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Storage Instructions: Store in the original container. Do not store in a manner where cross-contamination with other pesticides, fertilizers, food or feed could occur. In the event of spillage during handling or storage, absorb with sand or other inert material and dispose of absorbent in accordance with the Pesticide Disposal Instructions listed below.

Pesticide Disposal Instructions: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal Instructions: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary